will be explained with reference to Fig. 26(a) to Fig. 26(f). First, in Fig. 26(a) a clad 2502 is deposited on a surface of a silicon substrate 10 by the technique of CVD, sputtering, evaporation or the like stated before such that a thin film of silicon dioxide becomes a thickness of 200 nm - 50 μm. Then, a photolithography technique is used to form a taper hole 2502a in the clad 2502.--

IN THE CLAIMS:

Claims 1-8, 9-14 20-32, 38 and 80-84 have been amended as follows:

1. (Amended) A near-field optical head comprising:

a planar substrate having a first surface, a second surface disposed opposite to the first surface, and an inverted conical or pyramidal hole extending through the first and second surfaces and having at least one fine aperture formed at an apex thereof and disposed on the first surface;

an optical waveguide disposed on the second surface of the planar substrate for propagating light; and

a light reflection film disposed in the optical waveguide for reflecting in the direction of the fine aperture light propagated through the optical waveguide.

2. (Amended) A near-field optical head according to claim 1; wherein the optical waveguide is disposed inside of the inverted conical or pyramidal hole.

3. (Amended) A near-field optical head according to claims 1 or 2; wherein the inverted conical or pyramidal hole comprises a plurality of slant surfaces each having a different degree of slant from the other.

4. (Amended) A near-field optical head according to claim 3; wherein one of the slant surfaces has a degree of slant smaller than a mean degree of slant of the plurality of slant surfaces and is disposed in a vicinity of the fine aperture.

5. (Amended) A near-field optical head according to claim 3; wherein at least one of the slant surfaces has an angle of inclination smaller than 55 degrees with respect to a surface forming the fine aperture.

6. (Amended) A near-field optical head according to claims 1 or 2; wherein the inverted conical or pyramidal hole of the planar substrate has at least one curved slant surface.

7. (Amended) A near-field optical head according to claim 6; wherein the curved slant surface decreases in slant degree toward the fine aperture.

8. (Amended) A near-field optical head according to claim 7; wherein the light reflection film or the optical waveguide focuses light to the fine aperture or collimates light from the fine aperture.

9. (Amended) A near-field optical head according to claim 8; wherein the optical waveguide comprises a core and a clad disposed over the core.

10. (Amended) A near-field optical head according to claim 9; wherein the at least one fine aperture comprises a plurality of fine apertures; and wherein the optical waveguide and the light reflection film guide light generated from at least one light source to the plurality of fine apertures.

11. (Amended) A method of manufacturing a near-field optical head, comprising the steps of:

providing a planar substrate having a first surface and a second surface opposite the first surface;

forming through the first surface of the planar substrate an inverted conical or pyramidal hole having a fine aperture at an apex thereof;

forming an optical waveguide on the second surface of the planar substrate for propagating light; and

forming a light reflection film in the optical waveguide for reflecting light propagated through the optical waveguide.

12. (Amended) A method of manufacturing a near-field optical head, comprising the steps of:

providing a planar substrate having a first surface and a second surface opposite the first surface;

forming through the first surface of the planar substrate an inverted conical or pyramidal hole having a fine aperture at an apex thereof;

bonding an optical waveguide on the second surface of the planar substrate for propagating light; and

forming a light reflection film in the optical waveguide for reflecting light propagated through the optical waveguide.

13. (Amended) A method for manufacturing a near-field optical head, comprising the steps of:

providing a planar substrate having a first surface and a second surface opposite the first surface;

forming through the first surface of the planar substrate an inverted conical or pyramidal hole having a fine aperture at an apex thereof for scattering near field light;

disposing an optical waveguide on the second surface of the planar substrate for propagating light; and

forming a light reflection film in the optical waveguide for reflecting light propagated through the optical waveguide.

14. (Amended) A method for manufacturing a near-field optical head, comprising the steps of:

providing a planar substrate having a first surface and a second surface opposite the first surface;

forming through the first surface of the planar substrate an inverted conical or pyramidal hole having a fine aperture at an apex thereof for scattering near field light;

bonding an optical waveguide on the second surface of the planar substrate for propagating light; and

forming a light reflection film in the optical waveguide for reflecting light propagated through the optical waveguide.

20. (Amended) A near-field optical head comprising:

a planar substrate having a first surface, a second surface disposed opposite the first surface, and an inverted conical or pyramidal hole extending through the first and second surfaces and having a fine aperture formed at an apex thereof and disposed on the first surface; and

an optical waveguide disposed on the second surface of the planar substrate and on an an inner surface of the inverted conical or pyramidal hole, the optical waveguide having a sharpened microscopic tip protruding from the fine aperture of the inverted conical or pyramidal hole.

21. (Amended) A near-field optical head according to claim 20; further comprising a light reflection layer for reflecting light and formed on a periphery of the optical waveguide except for the sharpened microscopic tip.

22. (Amended) A near-field optical head according to claims 20 or 21; wherein the sharpened microscopic tip has a generally square pyramid shape.

23. (Amended) A near-field optical head according to claim 22; wherein the inverted conical or pyramid hole has a plurality of slant surfaces each having a different degree of slant from the others.

24. (Amended) A near-field optical head according to claim 23; wherein the optical waveguide comprises a core and a clad disposed over the core.

25. (Amended) A near-field optical head according to claim 24; wherein the planar substrate has a plurality of fine apertures; and wherein the optical waveguide and the light reflection layer guide light emitted from at least one light source toward the plurality of fine apertures.

26. (Amended) A method for manufacturing a near-field optical head, comprising the steps of:

providing a planar substrate having a first surface and a second surface opposite the first surface;

forming an inverted conical or pyramidal hole through the first surface of the planar substrate;

disposing an optical waveguide on the planar substrate and on an inner surface of the inverted conical or pyramidal hole;

forming a microscopic protrusion on the second surface of the planar substrate; and

forming a light reflecting layer in the optical waveguide for reflecting light propagated through the optical waveguide.

27. (Amended) A method for manufacturing a near-field optical head, comprising the steps of:

providing a planar substrate having a first surface and a second surface opposite the first surface;

forming through the first surface of the planar substrate an inverted conical or pyramidal hole having a fine aperture at an apex thereof; and

disposing an optical waveguide on the second surface of the planar substrate and on an inner surface of the inverted conical or pyramidal hole so that a sharpened microscopic tip of the optical waveguide protrudes from the fine aperture of the inverted conical or pyramidal hole.

28. (Amended) A near-field optical head comprising:

an optical waveguide comprised of a first clad having at least one inverted conical or pyramidal hole extending therethrough and having a fine aperture at an apex thereof, a core extending along a side surface of the inverted conical or pyramidal hole, and a second clad disposed over the core so that the core is disposed between the first and second clads; and

a first reflection film disposed on an end surface of the optical waveguide.

29. (Amended) A near-field optical head according to claim 28; further comprising a second reflection film disposed on a rear surface of the first clad and having a microscopic diameter hole disposed in a position corresponding to the fine aperture.

30. (Amended) A near-field optical head according to claims 28 or 29; wherein the end surface of the optical waveguide is curved.

31. (Amended) A near-field optical head comprising:

an optical waveguide comprised of a clad having at least one inverted conical or pyramidal hole extending therethrough and having a fine aperture at an apex thereof, and a core extending along a side surface of the inverted conical or pyramidal hole;

a reflection film disposed on an end surface of the optical waveguide; and

a substrate bonded on the core of the optical waveguide and having a refractivity different from that of the core.

32. (Amended) A method for manufacturing a near-field optical head, comprising the steps of:

providing a substrate;

forming a first clad on the substrate;

forming in the first clad at least one inverted conical or pyramidal hole having a fine aperture at an apex thereof;

forming a core in a depth direction along the first clad and a side surface of the inverted conical or pyramidal hole;

forming a second clad over the core so that the core is disposed between the first and second clads to form an optical waveguide comprised of the core and the first and second clads;

forming a reflection film on one end surface of the optical waveguide formed; and

removing the substrate.

A8

38. (Amended) A near-field optical head as in any one of claims 33-37; wherein the taper is asymmetric about a center axis of the taper passing through the apex.

A9

80. (Amended) A near-field optical head as in any one of claims 76-79; wherein at least one part of the focus functioning member is comprised of a dielectric material.

81. (Amended) A near-field optical head as in any one of claims 76-79; wherein the focus functioning member has a vertical surface extending in a light propagation direction, the vertical surface having at least one convex portion.

82. (Amended) A near-field optical head according to claim 81; wherein the focus functioning member is generally spherical-shaped.

83. (Amended) A near-field optical head as in any one of claims 76-79; wherein at least one part of the focus functioning member has a refractive gradient which is variable stepwise.

84. (Amended) A near-field optical head as in any one of claims 76-79; wherein at least one part of the focus functioning member has a grating structure.